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WE mentioned briefly last week the awards in the tenement-house competition, of which the premiated designs were illustrated in the last number of the *Plumber*. Not having been able to see the exhibited drawings, we can have no opinion concerning the wisdom of the awards; but the issue of the competition points to some conclusions which are safe and not altogether unexpected. We notice that all the prize designs are of one class, that is, they all have a yard at the back of the lot — which indeed was the one provision about which there could be no question, though some of the competitors neglected it — and they all show two buildings, each giving two suites of rooms to a floor, connected by a narrower neck, as it were, in which are stairways and closets, with a court for light and air in each side. In all there are lifts in the connecting centre, and in all but one water-closets, the water-closets in the fourth being in the yard at the rear. The tenements are all arranged in pairs on each side of the central axis of the building, and include three rooms apiece, excepting in one plan, where those in the rear building have but two rooms. The middle rooms necessarily have only borrowed light and air, though there is an effort to relieve the condition of some of them by ventilating-shafts in the walls. In two plans these shafts are widened so as to allow a window to open on them, and in that which won the first prize they are marked, as if with a grim feeling of satire, "light and air." The amount of light that would penetrate five stories down, to the bottom of a slot, one foot wide by six or seven feet long, in the thickness of a party wall, would hardly be worth the window provided to admit it, and the air which would be delivered from the windows of the lower rooms into those of the upper rooms would perhaps be hailed as a doubtful benefit. We should rather take our chance with a single ventilating flue of good size to each room. The rooms are necessarily small, ranging from eight feet by nine up to eleven by thirteen. The plans are on the whole ingeniously and compactly arranged, and, considering the restrictions of the case, may represent, apart from variations of detail, nearly the best thing that can be done. The question to which they lead is, How much is the best worth?

WE may assume, then, that to the judgment of the committee in this case, the best form for a tenement-house, in the ordinary conditions of New York, is a double building of four or five stories, with four tenements on every floor, each consisting of three small rooms *en suite*, the middle one of which is dark, and those which face toward the middle of the lot look upon dark courts of from five to eight feet wide, open to the air only at the top. This is not a very satisfactory conclusion, nor does the committee declare it to be so. The great stumbling-block is the necessity of making the thing profitable, in the degree in which real estate speculations in New York are expected to be profitable, to capitalists. To this end it was absolutely necessary to crowd as many rooms together as reason would allow. For this cause, all plans which allowed only one or two families on each floor were set aside without further consideration, says the committee in its report; on the other hand, some who provided for five or even six on a floor were ruled out as crowding beyond excuse. Having done this, and having fixed upon the four-family arrangement as that which best answered all the conditions, the committee wisely concludes, as far as making use of the customary New York lot of 25 by 100 feet is concerned, that, although many of the plans are an improvement on the existing tenement houses, "it is impossible to secure the requirements of physical and moral health within these narrow and arbitrary limits." It therefore urges that the only refuge is in enacting and enforcing laws which shall regulate the occupation, lighting, ventilation, and cleansing of such houses. In these conclusions most people who have no money staked in the question will be likely to agree with the committee. As the *Plumber* says, "With the license allowed to builders and landlords, no capitalist with a conscience can attempt to compete with unscrupulous and sordid men, whose sole aim seems to be to crowd the largest number of people under one roof, at the highest rental." The twenty-five foot lot is a hopeless element in the case, and if this could be eliminated it would probably still remain to enforce by legislation conditions at which competition should be possible to better-minded landlords. But such legislation would have to be carried in the face of an army of eager capitalists; and as for enforcing it, the power that does this will have to reckon with the people who live in the tenements, who are not fastidious, and will be easily persuaded that improvement of condition means increase of rent. These tenement-lodgers are a great army of voters.

APROPOS of this matter Mr. Henry Bergh has written a letter to the New York *Times*, in which he sets forth his own experience and conclusions in a way that is not encouraging. Some twenty years ago, for the sake of bettering the homes of the poor, he built ten houses in five stories, fronting on three streets, with a court-yard behind, laying them out for one family on a floor, taking pains to secure ample light and air, and putting gas-lights and oil-cloths in the halls. "For a while," he says, "these houses were the abodes of a cleanly and respectable people, but the handwriting soon appeared literally upon their walls, that they must succumb to the inevitable dominion of dirt, destruction, and disgrace. Their occupants destroyed the banisters, defaced the walls, blew out the gas instead of turning the faucets, and actually tore off the window-shutters to make fire of. Their children exercised their skill in whittling all that their knives would cut, and upon the jambs and doors of the entrances they carved every conceivable figure which savage taste could invent." The property depreciated, but taxes were not reduced; he tried to get a reduction of taxes or to rid himself of the property, but could do neither, and so the buildings "gravitated into a vast pile of unsightly edifices, the torment of their owner, and a perpetual bone of contention with the Health Department." The only remedy which Mr. Bergh can suggest is the radical one of forcing the tenement lodgers up the scale of living by legislation, insisting upon only one family on a floor, with plenty of windows and ventilated court-yards to the houses, and compelling the owners of existing houses to tear down partitions and open their rooms. When this is done it will be necessary, we fear, to provide also by legislation a class of landlords who will adapt themselves and their agents to the new order of things.

AN investigation of the trouble in the piers of the Hartford Capitol, and of the responsibility for it, is going on while we write. It is interesting for the people and legislature of Connecticut to know who is responsible, a matter which it seems difficult to come at; but for general uses it is more important to know what made the trouble, as a lesson which, in a time when a great deal of important work is done by very ignorant constructors, cannot be too widely known. It is in evidence, disclosed by drilling into them, that the stones of the granite facing of the brick piers were dressed to a joint but a very little way from the face, and worked off roughly behind, leaving large cavities to be pinned up and filled with mortar, — cavities which, however, do not appear to have been filled with anything, according to the evidence at the investigation and the account of our correspondent in another column, who says that nine tons of type-metal have been injected into the joints since they were partially closed by the settling of the piers. We do not clearly make out who ordered the change from the solid granite piers

which were specified by the architect to the brick piers faced with granite which were built; but most of the faulty directions are ascribed by Mr. Batterson, the contractor, to the late superintendent, Mr. Brown. The superintendent died during the progress of the work, and cannot defend himself here; if he was the father of all that is attributed to him, he was a superintendent whose demise can hardly have been a loss to the building which it was his duty to oversee. It was testified that after some of the stone-work had been set with mortar of the ordinary proportions and with quarter-inch joints, he ordered it taken down and reset with close joints and in mortar that was nine tenths lime. The brick cores of the piers, it is said, were laid in cement.

The builder, or architect, who made the drawings for the change in the piers, declared that he expostulated with Mr. Brown, and was referred to General Franklin, who insisted on using brick. He had recently — since the injury appeared, we may infer — computed the weight on the piers. His computation and that of Mr. Upjohn, the architect of the building, which do not differ greatly, indicate that it was a rather hazardous thing to make the change, taking into account the way such work is apt to be done. No human foresight can tell how the ultimate stress will be divided between the different materials of a compound pier, and therefore greater caution is necessary in proportioning such a pier than a homogeneous one. Caution would dictate that if the weaker material were in excess the whole pier should be proportioned as if composed of that only; and that if the stronger were in excess there should be enough of it to do duty alone. According to the computations, the load on each pier was about three hundred pounds per square inch. Now brick, as ordinarily laid, should not be loaded with more than about a third of this weight, say a hundred pounds to the inch. The weight computed for the granite alone was about four hundred and fifty pounds to the inch. Good granite in the mass is ten times as strong as brick; but for granite as it is too commonly laid, with thin face joints, pinned up behind with small stones, and thickly bedded in soft mortar, it is difficult to say what strength can be counted on, — certainly not four and a half times as much as brick-work, one would say.

Mr. Clarence Cook writes to the New York *Tribune*, lamenting the want of enterprise which allowed the Tanagra figurines, brought to New York by Mr. Feuardent, to be carried away to the Museum of Fine Arts in Boston, instead of securing them for the Metropolitan Museum. These figurines, about which General di Cesnola has also written a letter to the *Tribune*, are a collection of those which have been found during the last half dozen years in the ruins of Tanagra, a noted city of Bœotia, long since destroyed and deserted. The first were discovered in 1870 by peasants in the neighborhood, who, searching for building-stone, came upon old tombs which had not been opened. They were at first neglected, being of little value to plunderers whose only desire was for precious metals. After two or three years, however, they attracted the attention of archæologists, and a demand arose which raised the price of them to an extravagant pitch, and set the peasants at work with such effect that hundreds of tombs were opened in the search. In all the unrifled tombs they were found, two or three at a time, till two or three thousand of them have been discovered, first and last, the most of which have been secured for the various European museums, in London, Paris, Berlin, Vienna, and Rome; but there still remain many scattered about in the hands of private collectors and dealers. This collection, of a score or more, is the only one that has been brought to this country. It was expected that the Metropolitan Museum, having the Cesnola collection, to which this is a natural companion, would buy them, but while there was question of raising the fifteen hundred dollars which was their price, and apparently a doubt whether the Trustees of the Museum wanted any more antiquities, Mr. T. G. Appleton of Boston bought them and presented them to the Museum there.

They are small figures in terra cotta, only a few inches high, in a variety of attitudes and dresses. There has been some disposition to make them out deities, but without great success in identifying them. The character of their costumes, and a certain every-day look that they wear, makes it seem more likely that they are simply such naturalistic ornamental figures as it has been the habit of people of all ages to make for the decoration of their houses, and that they were buried with their owners, like other valuables, with no thought of special religious significance. They are ascribed to the fourth century B. C., and their special interest in the eyes of archæologists is that, unlike the admired relics of classical sculpture, they give us representations of the common costumes and habits of ordinary people among those who made them; and that they show the local peculiarities of what we may call a provincial folk at the height of the classical period of Grecian art.

The modelling of the statue for the Byron Memorial in London has been finished, and the statue is shown before being put into bronze. It is the outcome of a competition which attracted a good deal of notice two or three years ago (see *American Architect* for July 15 and December 16, 1876). A very queerly managed first competition brought out some forty models, none of which were accepted, but the sculptors of six of them received the empty honor of an invitation to a second competition which, like the first, was open to all comers. On the second competition Mr. Belt was successful, and it is his statue that is now exhibited. It represents Byron sitting upon a rock, his head supported by his right hand, and his elbow resting on his knee, while his left hand holds a note-book and pencil. He wears his sailor shirt with open collar, his cloak is thrown over the rock, and his favorite Newfoundland dog is by his side. The figure is of "heroic" size, nine feet high, and the bronze will stand upon a block of Pentelic marble, presented by the Greek government, and fashioned into a pedestal ten feet high. Mr. Belt is a young sculptor and comparatively unknown, but has already shown some creditable work in a statue of Izaak Walton for St. Mary's Church, Stafford, and one of Charles Kingsley for Chester Cathedral, which he has been commissioned to duplicate for the Queen's private collection. His statue of Byron seems as little at home in London as its subject would be, if he could return thither, or as the obelisk was on its arrival; for there is great difficulty in finding out where to lodge it. The first intention was to set it in the Green Park, opposite Piccadilly Terrace; now it is a question whether it shall be at the head or the foot of St. James Street.

While we have been talking of the need of training and cultivation among young architects and students, we have been reminded of one drawback which is a serious impediment to their learning all that they might be expected to learn in the course of their work. By the nature of their occupation, draughtsmen are kept at office work every day and all day, so that they are practically debarred from one of the most effective means for their education, the use of their eyes outside their offices. They seldom have a chance to watch the work which goes up about them, to study its character and effect in what is the most instructive way, by seeing it grow before their eyes. It is only by a rare chance that they are even able to examine the effect in execution of the work for which they have themselves made the drawings. If there are museums and collections about them which contain valuable materials for their study, they cannot visit them. This disadvantage naturally weighs most on those who are most efficient, because they are most continuously employed. It may be said that it is no greater confinement than befalls those who are practicing the beginnings of any other occupation; but it does indicate some hardship to learners whose due instruction depends on many things outside their immediate work, and it points a moral against the unwisdom of those who are in haste to get their whole training inside of offices. There are architects who make an effort to relieve this difficulty by giving their pupils and draughtsmen a half-holiday on one afternoon in the week, naturally on Saturday, and who say that it is made up to them in the increased interest and efficiency which it brings. Such an indulgence might not be possible when work was specially pressing; but there are many times in every office when it could be allowed without injury to the immediate work, and we are inclined to think something like it would be found to justify itself in most offices by the spur it would give to the activity and knowledge of those students, at least, who were willing to profit by it.

The latest accident which can be laid to the charge of the shoddy builder is the fall on March 10 of the floor of Mechanics Hall at North Berwick, Me., during a town meeting. Thirty or more persons were seriously injured, some fatally.

THE OPEN FIRE-PLACE. VIII.

IMPROVEMENT IN THE FORM OF THE CHIMNEY THROAT.

THE next important step made was in the improvement of the form of the smoke flue where it connects with the fire-place. Cold air, being heavier than warm, will fall below the latter, and press it upwards to make way for itself. Thus the air in the neighborhood of the fire-place will press the hot smoke up into the chimney throat. If this throat is only large enough to take the smoke, hot air only will enter the flue and the draught will be rapid. But if the throat is larger than necessary, that part of the cool air of the room which enters the fire-place and becomes most heated by the fire, and next in buoyancy to the smoke, will, in its turn, be pressed up by the cooler air behind it, and enter the flue alongside of the smoke. Indeed, the entire volume of the air of the room, being warmer than the outside air, will tend to enter the flue with the smoke, so long as there be room provided for its entrance. The heat of the column, and consequently the rapidity of its rise, will therefore be proportionally diminished. For this reason the throat of the chimney should be contracted until it is no larger than is sufficient to carry off the products of combustion. A similar contraction throughout the entire length of the flue would be desirable, were it not that an allowance must be made for clogging up by soot, and for the resistance by friction to the passage of the air offered by the rough walls of the flue.

The first to recognize and apply this principle was Count Rumford (1796–1802). He published a number of valuable and interesting essays on various matters of domestic economy, one of which was devoted entirely to fire-places and chimneys. But he is to be blamed for not investigating or at least acknowledging the progress made by his predecessors in this particular. He says, "It is, however, quite certain that the quantity of heat which goes off combined with the smoke vapor and heated air is much more considerable, perhaps three or four times greater at least, than that which is sent off from the fire in rays, and yet small as the quantity is of this radiant heat, it is the only part of the heat generated in the combustion of the fuel burned in an open fire-place which is ever employed, or which can ever be employed in heating a room;" and again, "As it is the radiated heat alone which can be employed in heating a room, it becomes an object of much importance to determine how the greatest quantity of it may be generated from the combustion of fuel." Thus, however much good he may have done in improving the form of the chimney throat, and in calling public attention to the advantages of bevelled over rectangular jambs, he certainly also did much to discourage any further effort in economizing the waste heat of the smoke, and should therefore be considered as having really done more than any other one man to *retard* the proper development of the subject. He complains of the enormous waste of heat, and regrets that no means of saving it can be invented, in the face of the discoveries of both Savot and Gauger. Even his bevelled jambs for better reflecting the rays into the room had long since been recommended by Gauger. They were brought forward as quite new by Rumford. In speaking of the waste in unconsumed smoke, he says, "I never view from a distance, as I come into town, this black cloud which hangs over London, without wishing to be able to compute the immense number of chaldrons of coal of which it is composed; for could this be ascertained, I am persuaded so striking a fact would awaken the curiosity and excite the astonishment of all ranks of the inhabitants, and *perhaps* turn their minds to an object of economy to which they had hitherto paid little attention." Yet he gives no way of consuming the smoke or of alleviating the evil.

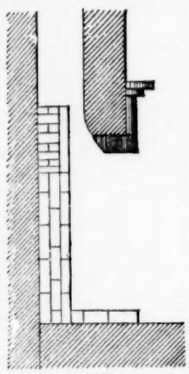


Fig. 49. From Peclet.

Figs. 49 and 50 represent the so-called Rumford stove or fire-place. He contracted the area of the fire chamber and gave the sides an angle of 135° with the back, or, which is the same thing, of 45° with the front of the fire-place, in order, as he said, to reflect the greatest possible amount of heat into the room. He considered the best proportions for the chimney recess to be when the width of the back was equal to the depth from front to back, and the width of the front or opening between the jambs three times the width of the back. These proportions are used to-day, and are undoubtedly the best. He objected to the use of iron for these surfaces on account of its great heat-conducting power, which wasted the heat and cooled off the fire, but advocated some non-conducting substance, such as fire-clay. He also objected to circular covings, on the ground that they produced eddies or currents, which would be likely to cause the chimney to smoke.

Fig. 50. From Tomlinson.

But his chief, or perhaps only, real improvement consisted in the reduction of the size of the chimney throat, and the rounding off of the lower edge of the chimney breast, as shown in Fig. 51, in order, as he said, to afford less obstruction to the ascent of the smoke. When the chimney required sweeping, the plate or flagstone opposite this rounded edge could be removed so as to open the throat, and be replaced after the operation. This form, as given by Rumford, is however still defective. The smallest part of the flue should be at the bottom, as shown in Fig. 52, so as to prevent the entrance into the flue of unburnt air from the room. From this point it should increase somewhat, to allow of a slight expansion of the heated column and to diminish its friction against the walls of the flue, as well as to allow for a partial clogging by soot and for the resistance to its passage offered by the roughness of the plaster. The back of the fire-place should also incline forwards, as shown, in order to increase its radiating effect as well as that of the flame.

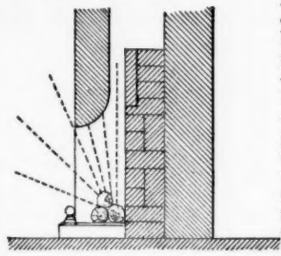


Fig. 51.

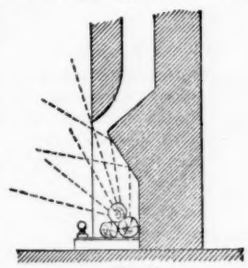
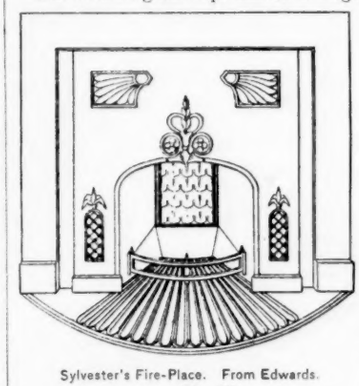


Fig. 52.

The simple and earnest style of Count Rumford's essays, the substantial nature of his acknowledged improvement, the facility with which it could be tested, and the enthusiasm with which he urges its importance, the detailed directions he gives for the guidance of the builder, and the liberality with which he offered the free use of his invention and services to the public, all tended to make a permanent impression, and not only to give the Rumford fire-place precedence over all others, but even to place the latter altogether in the shade. So much in the shade that, though infinitely more important as tending to improve the ventilation of the apartment, and the draught of chimney, as well as to save the waste heat of the fuel, they were almost forgotten, and, so far as the mass of the public is concerned, remain so up to the present day. So great was the influence of Count Rumford as a man of science, and his ability as a writer, that his failure to acknowledge the value of the efforts of his predecessors seemed like a tacit condemnation of them, and proved the severest blow to the cause.

Almost all modern grates are based upon the principles explained by Count Rumford, and a fire-place was considered perfect which was made in accordance with them. It was a rare exception when anything beyond this was thought possible.

The modern grate represented in Figs. 53 and 54, called Sylvester's patent, formed one of these exceptions, and was introduced about twenty years ago. In this the fire was put lower down than it had been at any time since coal became the staple fuel. The bottom of the grate was formed of separate bars, which extended considerably into the room. A curb of iron and a raised bar of circular form were used to enclose the bars and answer the purpose of a fender. The back and sides of the fire-place were formed of fire-brick. Instead of the register door above, Venetian plates were provided at the back of the grate for the escape of the smoke, which could be opened more or less by a touch with the poker. This grate is quite common with us to-day; but it is rare that we see it with the ventilating attachment shown in the figure, and operating on the old principle of the fire-place at the Louvre, described by Savot. The air from the room was warmed against the back and top of the fire-place, in the spaces shown in the section, and afterwards returned into the room.



Sylvester's Fire-Place. From Edwards.
Fig. 53.

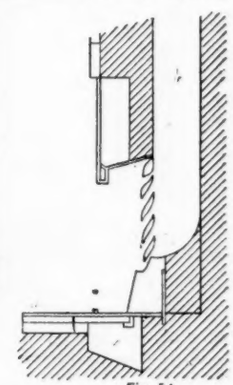


Fig. 54.

The contraction of the chimney throat by means of the Venetian plates, which could easily be regulated, was an excellent application of the principle advocated by Rumford. The projecting bars reflected considerable heat, but there were certain disadvantages. The

apparatus was necessarily expensive. It required more than usual care in setting. The fire was injudiciously low, and the necessity of removing the bars individually for the purpose of taking away the dust, and of then replacing them, was objected to from the fact that the operation was an unusual one, and one, therefore, which domestics were certain to object to.

Figs. 55 and 56 represent the so-called Stephen's grate. This

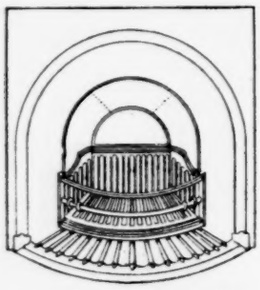


Fig. 55. Stephen's Fire-Place. From Edwards. Fig. 56.

has no ventilating flues. It was simply built after the Rumford principles, and may be taken as a type of what was and is considered a perfect grate or fire-place. As in Sylvester's device, the smoke passes away from behind, but through a single arched aperture instead of between Venetian plates. A polished surface of iron fills up the space between the aperture and the front of the grate. A pan to receive the ashes is fitted below the fire bars, and is made to project a few inches in front of them, where it is covered by an open grating. Fire-brick is used behind the bars to enclose the fire, and a door to move backwards and forwards is used to regulate the opening into the chimney. The iron-work is ground and stained black for dining-rooms and libraries, and is ground and polished bright for drawing-rooms.

Burnished steel and ormolu are introduced, of course, for those who can afford to pay for them, and the ash-pan itself is sometimes constructed of stamped and highly burnished steel bars, which, according to Edwards, the grate manufacturer, gratify the ladies by their brightness. Two curious circumstances attending the introduction of this grate are that it was not made of a semicircular form by the inventor, but elliptical, and that the notion was given over for a small sum of money to a manufacturer, who called it a patent, and retained the sole privilege of using it for many years, till it was discovered that there was no such thing as a patent in existence. Even before the introduction of Stephen's grate, another one, known as King's patent, and shown in Figs. 57 and 58, was introduced, which combined several similar qualifications, but only succeeded in becoming very little known. The form of the upper part was square in-

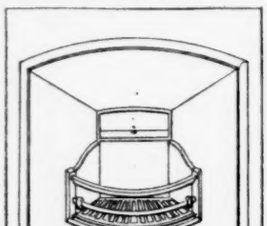


Fig. 57. King's Patent Grate. From Edwards. Fig. 58.

stead of semicircular, and the door at the back of the grate, instead of being suspended from the bottom, as in Stephen's apparatus, was suspended from above and balanced by chains and weights, so that a slight touch with the poker could move it up or down at pleasure, and increase or diminish the draught. This fire-place was, scientifically speaking, superior to Stephen's. The amount of reflecting surface was greater than in the semi-circular form, and the draught into the chimney was far more perfectly regulated than by the Stephen's door. It is curious to observe how instantaneously the draught is affected as the door is brought in proximity to the fire or is removed from it, and how perfectly all the products of combustion are carried off when the opening into the chimney is exceedingly contracted. The grate, however, failed to excite much attention for one reason, and one only, namely, that the square form was not at that time calculated to be so popular as the arched form. "It is," says Edwards, "of no use to attempt to reason upon matters of taste. It suffices to state that the arched form was at that time novel, and that few would look at any other. King's grate was subsequently made of the semicircular form, but not until the other had got the run, and it had become practically impossible to supplant it."

THE SLIDING BLOWER.

Soon after the improvement made by Rumford, Lhomond added a movable blower, as shown in Figs. 59, 60, 61, and 62, allowing the

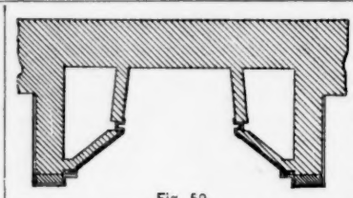


Fig. 59.

opening of the fire-place to be increased or diminished at will. In this way the entire current of air could be turned upon the fuel, and the open fire-place becomes transformed into a closed stove, so far as the concealment of the flame and the improvement of the draught is concerned. This is sometimes very useful with chimneys liable to smoke, especially when the fire is first lighted, and it is very generally used in Europe, especially in Paris. The blower is composed of one or more leaves of sheet metal, Fig. 60, sliding one over the other in the slots, as shown on the plan. The lowest is supported in the middle by a chain which passes over two pulleys, and is balanced by a weight. The use of these blowers is, of course, an effective cure for smoky chimneys, because it may be closed so as entirely to cover the fire, but it is an expensive cure, since it sends a part of the radiant heat up the chimney. It is true that the high conductibility of the metal plate allows heat to pass through it rapidly, but the loss is nevertheless very great when closed over non-ventilating fire-places. Its use is only to be recommended where no better means of preventing smoke is to be found, or where a powerful draught is required to light the fire rapidly.

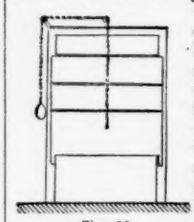
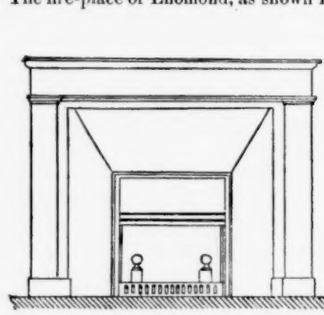


Fig. 60.

A good arrangement of the grate for burning coal is to have the entire grate project beyond the fire-place so as to utilize the greatest possible amount of radiant heat. A semicircular hood of metal over the fire would then serve to direct the smoke into the chimney. This hood, being a heat conductor, would also transmit a large portion of the rays of heat into the room.

The fire-place of Lhomond, as shown in Figs. 61 and 62, is designed



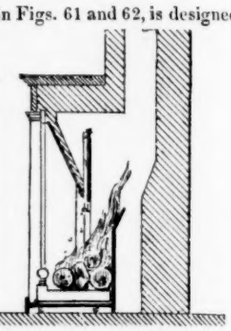


Fig. 61. From Peclet. Fig. 62. From Peclet.

for wood, but by putting a grate in place of the andirons it may be used for coal.

THE ILLUSTRATIONS.

UNITARIAN CHURCH, WASHINGTON, D. C. MR. R. G. RUSSELL, ARCHITECT, NEW HAVEN, CONN.

This church measures 59 by 90 feet, and has a vestry 26 by 72 feet. It will seat 550 on the main floor, and, including the gallery over the vestibule, it will seat 700 persons. The base and weathering are of brown Portland-stone. The arches are of Portland and Ohio blue stone. The walls are faced with Washington pressed brick, with some black brick, all laid in black mortar. The inside is finished with brown ash relieved with black walnut. The cost of the building completely finished and furnished, has been $40,000.

GRAMMAR SCHOOLHOUSE IN THE BRIGHTON DISTRICT, BOSTON, MASS. MR. G. A. CLOUGH, CITY ARCHITECT.

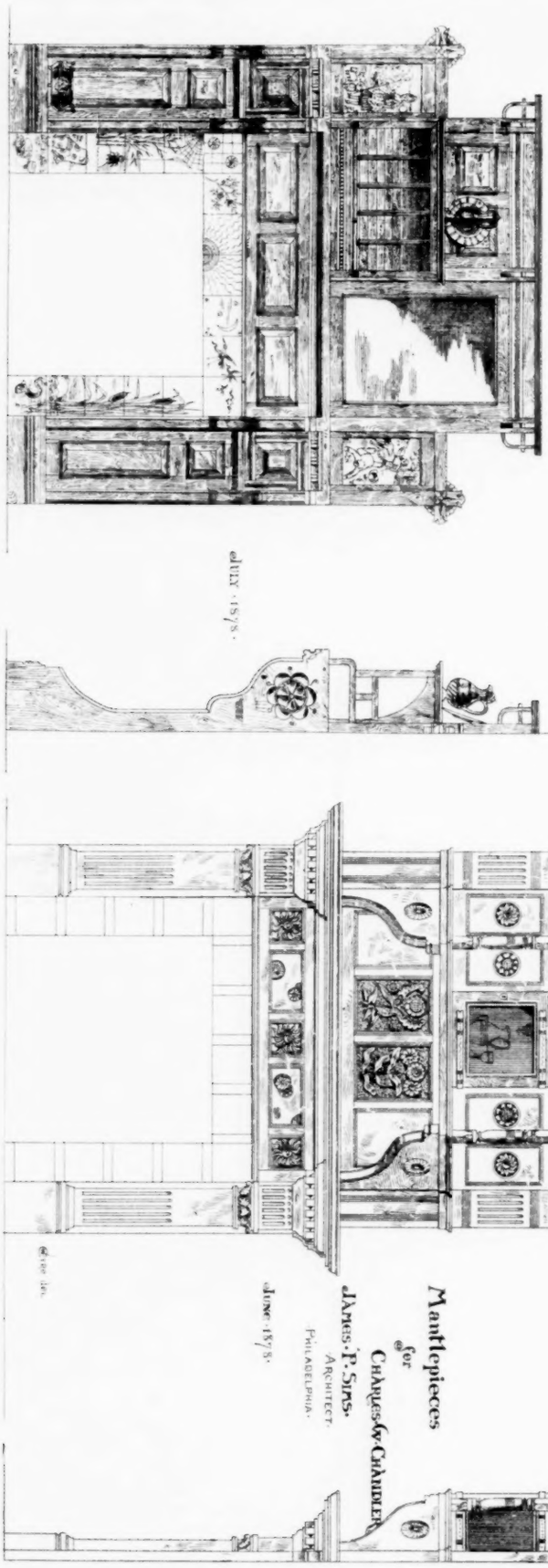
This school is intended for both girls and boys, and the separation of the two portions of the building, which in the first story is unnecessary for obvious reasons, is effected in the second story by an unpierced partition wall.

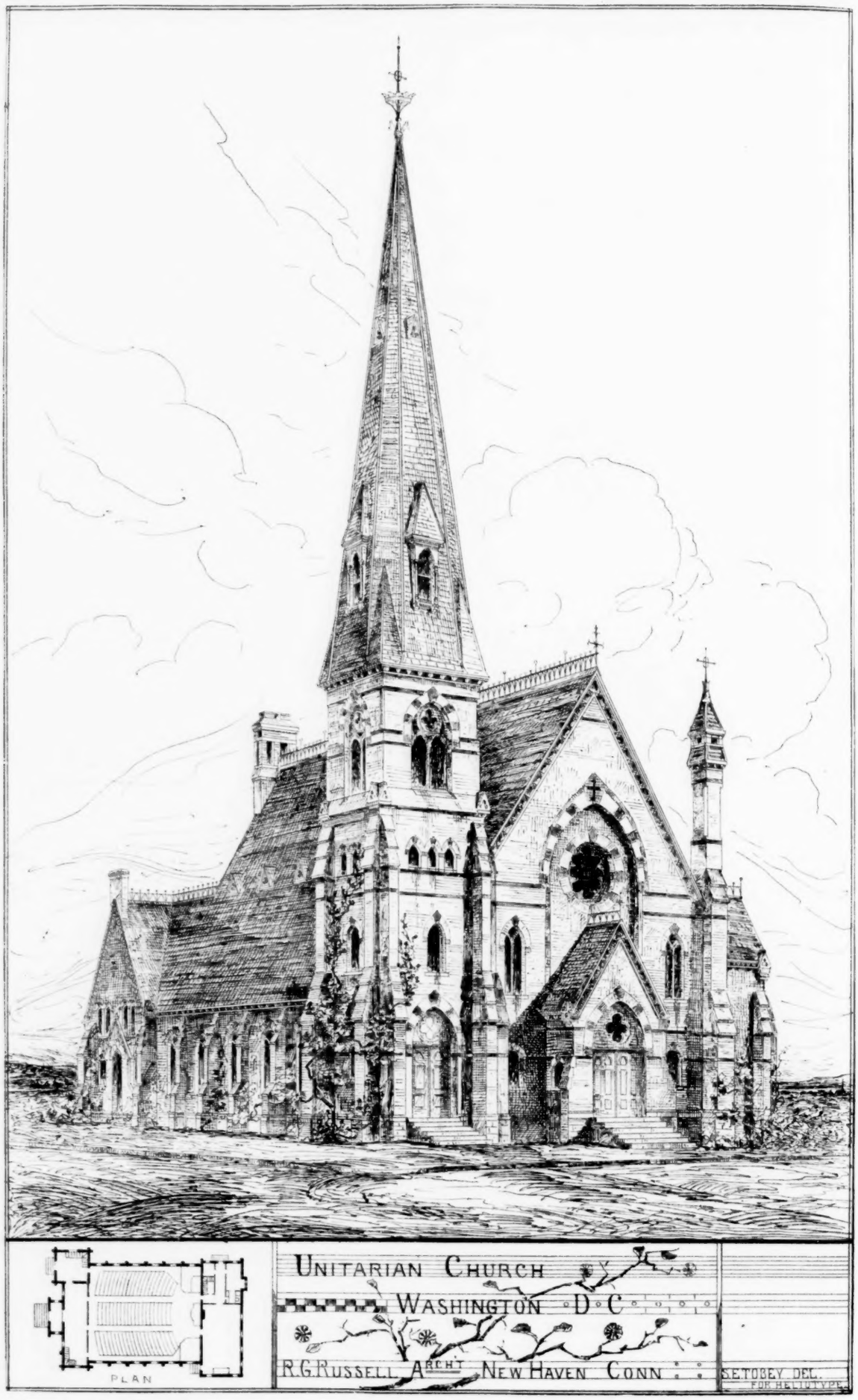
DESIGN FOR THE WASHINGTON MONUMENT.

We print this week a design for the Washington Monument which has been sent us by an architectural student, and it occurs to us to suggest to other students that they will rarely meet with a better opportunity to try their powers of design. It would please us to receive the results of any attempts at the solution of this problem.

Of the design here published, which is evidently suggested by Mr. Story's design, the author says:

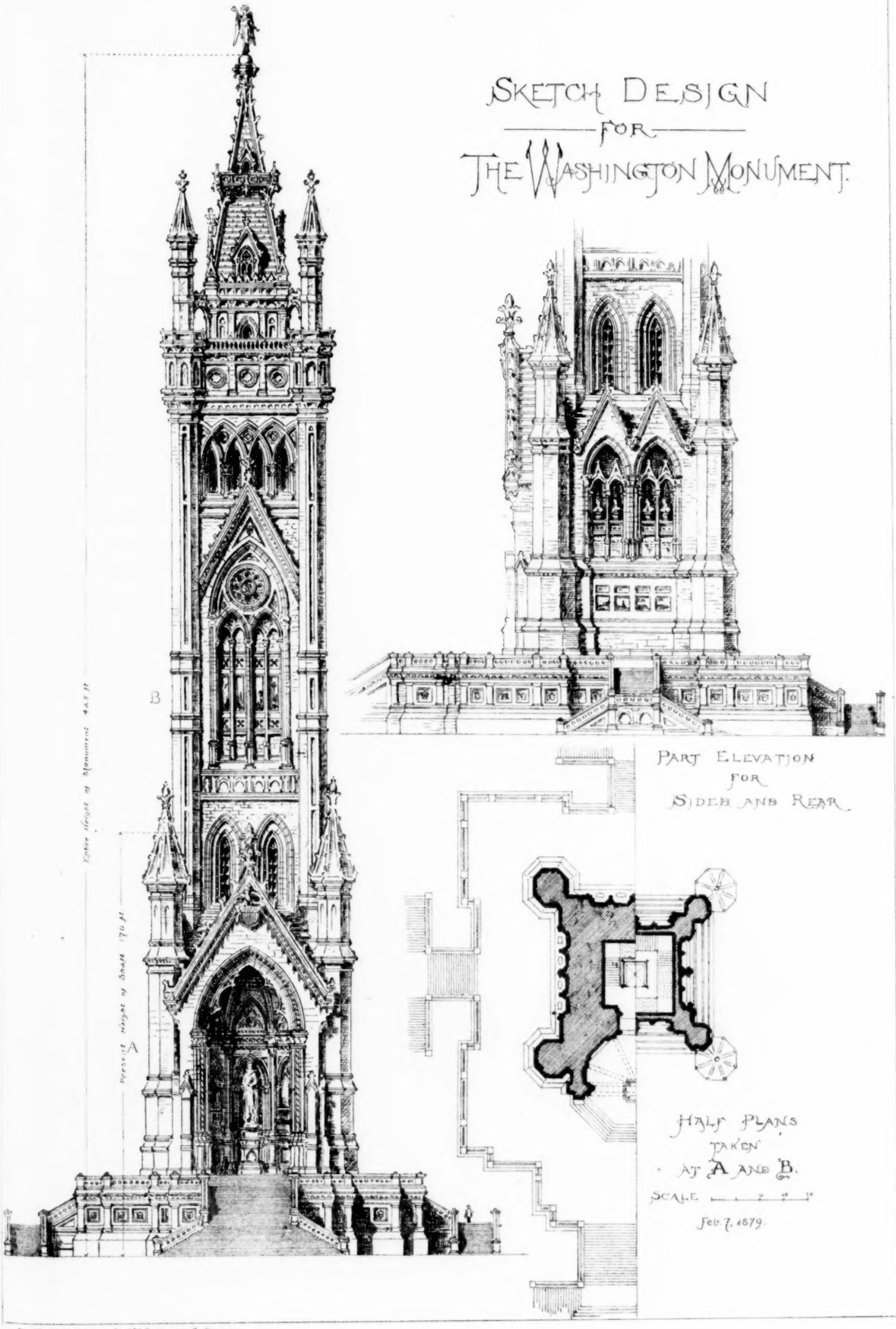
"The Gothic treatment adopted would allow one side of the base to predominate over the others. On the main front a large porch would enclose the statue of Washington, behind which the wall would be pierced by a large window; a door below giving access to the monument wherein are stairs and an elevator ascending to the summit. The other sides of the porch would be decorated with scenes from the life of Washington, in fresco or mosaic. The sides and rear of the structure would be treated, as shown, with niches for busts of


Mantelpieces
for
CHARLES W. CHANDLER
JAMES P. SIMS.
ARCHITECT.
PHILADELPHIA.
June 1878.



THE HELIOTYPE PRINTING CO. 240 DEVONSHIRE ST. BOSTON.

SKETCH DESIGN
FOR
THE WASHINGTON MONUMENT.



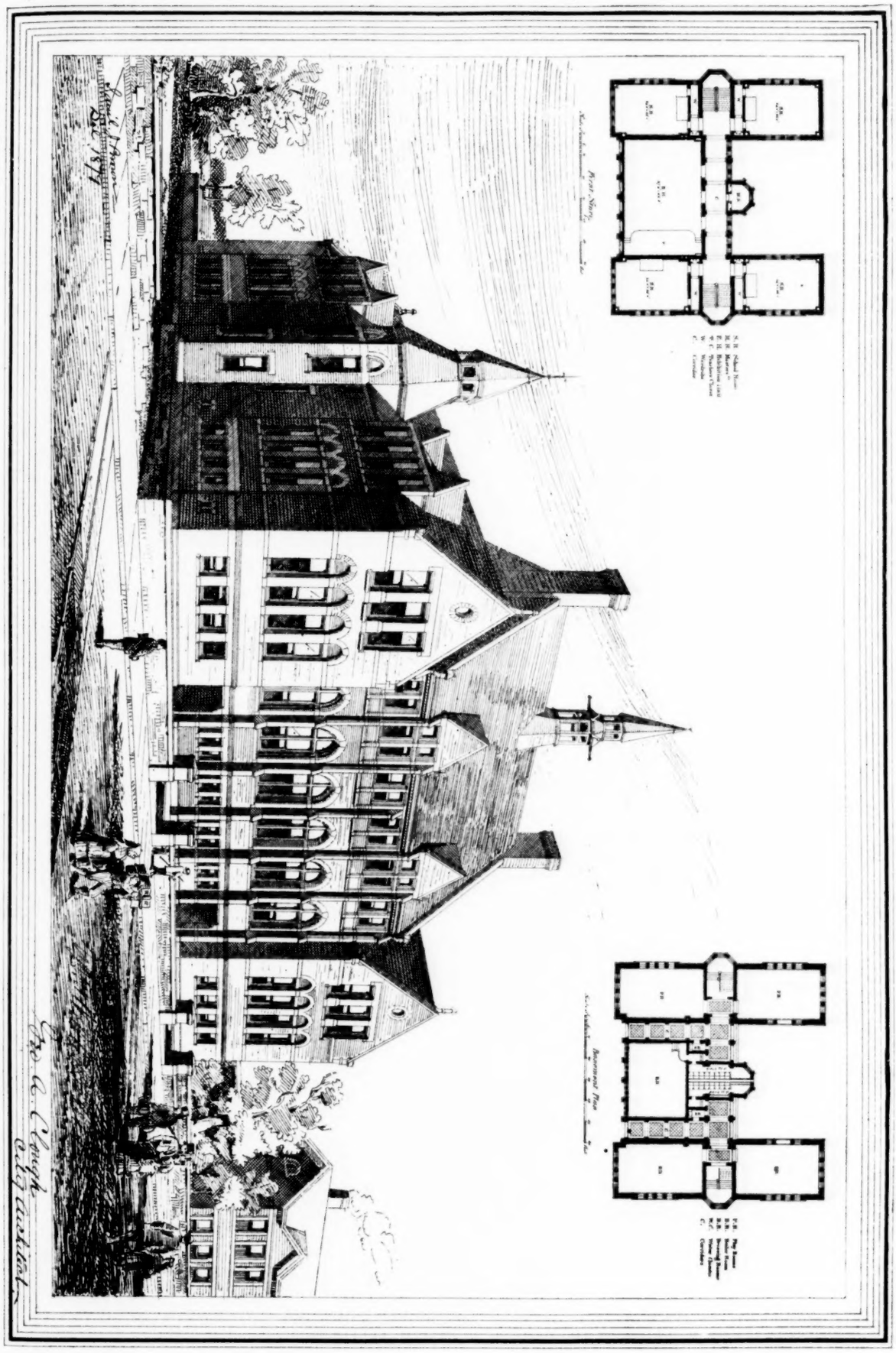
PART ELEVATION
FOR
SIDES AND REAR

HALF PLANS
TAKEN
AT A AND B.

SCALE

Feb 7, 1879.

THE HELIOTYPE PRINTING CO. 330 DEVONSHIRE ST. BOSTON.



GRAMMAR SCHOOL HOUSE, BRIDGEPORT, CONN.

twelve Revolutionary heroes, while below would be panels representing scenes from the Revolution. Above, in the central division of the shaft, could be bas-reliefs representing the four sections of the country; in the gable over these panels could be placed the arms of the Washington family. The base of the monument would be twenty-seven feet above the ground, on a platform around which would be panels contributed by the forty-six States and Territories, carved with their respective arms."

MANTEL-PIECES FOR MR. C. W. CHANDLER, GERMANTOWN, PENN. MR. J. P. SIMS, ARCHITECT, PHILADELPHIA.

These mantels are built of oak wood.

THE PLUMBING IN A FIRST-CLASS BOSTON HOUSE.

II.

PASSING from practical to experimental sanitary work, those who have constantly presented to them the problem of the efficient drainage of country houses may take an interest in the details of an attempt to carry out the Moule system of subsoil irrigation, as described by Colonel Waring in his papers in the *Atlantic Monthly*, and noticed by several other writers.

The house to which the system was applied stood at the upper side of a plot of about half an acre, sloping quite rapidly to the northwest. Both the owner and the architect had been interested in the descriptions of the system, and were desirous of trying it, and the sloping ground seemed to give a favorable opportunity, as affording space to lay the outlet pipes close to the surface, without any fear that the waste water could back into the house if they should be frozen or clogged, which seemed the chief danger. With the kind assistance of Colonel Waring, the scheme was laid out as follows: Just outside the basement wall, an iron Field's flush-tank was sunk some four feet below the surface. Over the grating of this discharged the wastes of kitchen and pantry sinks, wash-trays, and bath. A wooden box, brought up to the surface, with a cover, gave access when required. The drainage of the wash-bowls was led away by a separate pipe, to lose itself in a trench filled with broken stone at another part of the plot, while the soil-pipe from the water-closets discharged into a separate drain, which joined that leading from the outlet of the flush-tank about twenty-five feet from the house. The two drains, one from the tank and the other from the soil-pipe, after joining continued some twenty-five feet farther down the hill to a tight circular cesspool, five feet in diameter and five feet deep, of hard brick in cement, sunk so far as to bring the crown of the dome about one foot below the surface. The land inclined so much that the cover of the cesspool was below the outlet of the flush-tank, so that any accumulation of water in the pipe, caused by a stoppage beyond, would, by the time it reached the tank, lift the cover off the cesspool, and the subsequent additions would flow away harmlessly over the surface of the ground below, without the possibility of its backing up into the house. This seemed at the time a wise precaution, but experience shows that it was quite unnecessary. The brick cesspool as a part of the system was rendered essential by the introduction of the soil-pipe drainage, which could not enter the flush-tank, and yet required a place of storage, where solid matters or substances likely to choke the subsoil pipes might settle or gradually dissolve. The soil-pipe was without trap of any kind, and half a dozen holes drilled in the stone cover of the cesspool served to admit air to the whole length of the soil-pipe and drain. A four-inch outlet pipe was built into the lower side of the cesspool, about four feet below ground, and continued nearly level, with water-tight joints, obliquely down the hill, until the fall of the ground brought the pipe within sixteen to eighteen inches of the surface. Then the line was continued by a succession of Y-branches forming a curve, such as to give the pipe a grade of about one quarter of an inch to a foot, but keeping it everywhere at the same distance below ground. From the unoccupied branches of the Y's, lines of two-inch unglazed pipe-and-collar land drain were carried back, making an acute angle with the main line, and curving around the outline of the hill so as to describe almost a series of contour lines, except that the pipes were laid to a slight inclination, one inch to twenty-five feet, and the extreme ends of the lines were brought very near the surface, — within eight or nine inches. Three hundred feet were laid in this manner, in nine or ten parallel lines, the trenches filled in, and the place sown with grass seed.

The whole arrangement worked perfectly through the autumn and winter. In the spring, the ground was dug over for re-planting, and advantage was taken of the opportunity to examine the pipes and see what condition they were in. By this time the water had begun to make its appearance through the ground at the ends of the lines of pipe. All the rows stopped close to a fence, and the open ends being near the surface, and in loose, newly-graded soil, the liquid had found its way out, and had worn a channel through which a little stream trickled away and disappeared in the grass on the other side of the fence. At its first appearance, where the ground was almost without vegetation, a certain amount of smell could be perceived, but where it ran among the grass there was nothing of the kind. The water from the pipes was rather milky, and wherever it rested for a time it left a blackish scum, but the quantity was very small in proportion to the volume of water. On exposing the lines of pipe, it was found that a similar scum had accumulated wherever there was any check to the flow. The lower end of the chain of Y's had been cemented tight, and these having been laid with considerable pitch, the lower portion formed a kind of pocket, and the liquid reaching the end was obliged to turn back on itself to get into the outlet pipes. This turning back of the current had led to a considerable deposit of sediment, so that the last two or three Y's were completely filled with black mud, which prevented the water from getting into the lines of outlet pipe which connected with them. In one or two places, also, the open-jointed pipes had not been evenly laid, or had settled, and the water lingering in the depression had also thrown down a slime sufficient to partly fill the tube; but wherever the flow was unobstructed they were washed perfectly clean. The clogging of the soil which had been anticipated was found not to have taken place in the slightest degree. Whether the oxidizing action of the air so near the surface had destroyed the organic matter as fast as deposited, or the flush-tank and the settling cesspool had together been able to keep back the slime which so soon clogs the ordinary leaching cesspool, may be a question, but it is certain that the soil, which was a compact marl, retained hardly the slightest trace of the 20,000 gallons or so of sewage which had been discharged through the pipes.

When the pipes were relaid, the lines were left open, to watch the absorption by the soil in the bottom of the trenches. The slight flow which constantly trickled from the flush tank was taken up immediately, and the discharge of the whole tank by means of the siphon, which took place about twice a day, remained not more than five to ten minutes in the trenches before being entirely absorbed. In the relaying, additional trenches were made, and about one hundred and fifty feet more of pipe put down. The Y's were cleaned, and the last one, instead of being closed, discharged directly into one of the new lines of pipe. The grade was rectified and the trenches inspected to see that the outflow from the joints was uniform throughout each line. The collars of the original pipes fitted very tightly, so that the flow through some of the joints was almost nothing; in relaying, the collars were for the most part omitted, and the new pipes were ordinary sole tile without collars. To guard against the bugbear of the pores of the ground becoming filled, as well as to save the pipe from displacement, a row of small stones was put on each side before covering in. The whole has since continued to work well.

Of the agricultural value of the system, it was impossible to judge, as the ground under which the pipes were laid was poor, and had just been rather thinly sown with grass, but that the liquid had some fertilizing properties was shown where it escaped from the surface and trickled through the fence. Here it lost itself in a patch of grass which reached an enormous growth, one root among many having sent up twelve stalks each over six feet in height.

The perfect practicability of this mode of drainage in so exposed a situation still needs to be tested by a winter more severe than the last, but wherever it can be applied, the advantage over the leaching cesspool seems very considerable. The cesspool, in all but the most open soils, is certain to get clogged before many months, and the cleaning out is as troublesome and costly as the cleaning and relaying of a whole system of pipes, and is horribly offensive, while the smell from an exposed row of pipes is almost nothing, and can be wholly subdued by a few handfuls of earth. The stoppage of the pipes if properly laid is probably impossible. It must be considered that the area of outlet in five hundred feet of pipe laid one sixth of an inch apart is five hundred square inches, or nearly one hundred times the capacity of the drain which supplies them, while the area of soil presented to the current, supposing the tiles surrounded by dense clay, so that the water could only creep along the sides of the pipes, would be three hundred and seventy-five square feet, or about six times that available in an ordinary cesspool, while a few stones along the sides of the pipes would double even that. Moreover, if a stoppage should take place in all the pipes, it would be extremely gradual, joint after joint being closed, and the taking up and relaying of five feet of pipe would again give an outlet equal to the inlet, while a cesspool chokes all at once, and the first intimation of trouble is given by finding ten to a hundred gallons, the amount of the emptying of a wash-tub, or a flood of surface-water from a heavy rain, poured out over the basement floor; and the whole annoyance and expense of a thorough cleaning must be endured before the drains can be used again, while only assiduous disinfecting will ever make sweet again a cellar once soaked with sewage. As to the theoretical virtues of discharging the house-waste within reach of the air contained in the surface soil, it is only necessary to refer to any book on sanitary engineering; we have also to consider the convenience and the relative expense, as well as the probable defects, of the different methods which it is possible to employ, and a little relation of practical experience may be useful to many who hesitate to spend their clients' money on devices which they know only through the glowing descriptions of sanitary reformers.

CORRESPONDENCE.

THE TENEMENT-HOUSE PROBLEM.

NEW YORK.

IN press and pulpit, at public meeting and on all sides, general attention is now turned to the tenement-house problem. The charitable workers have had the fact forced upon them that an overwhelming proportion of our city crime finds its origin in the tenement-house districts. The church workers find that they make no head-

way against this great wing of the population. The police complain of it. The Building Department shrugs its shoulders and keeps on granting permits for such buildings. The Health Board uses it when startling lessons are to be vividly illustrated by facts and figures, with arrays of hospital cases and high death-rates. Other cities have their figures paraded in comparisons with those of the metropolis, and altogether it makes a picture dark and dreadful enough to discourage the most sanguine; and then suddenly comes up the cry from the super-charitable enthusiasts, Let us abolish the tenements! and the cry is taken up as the great discovery of cure. But this short-cut solution of the difficulty, embodied in the recommendation to sweep the tenement-house out of existence, is predicated on a false basis and is sustained by facts drawn only from one side of the picture.

The tenement-house is peculiar to New York, of all the cities on this side the Atlantic; those great packing-boxes of humanity, where in mere cupboards of rooms families are supposed to build up for themselves a home life, are essentially a metropolitan institution. They are of course to be found in Jersey City and in Brooklyn; but New York retains the choicest specimens of overcrowded, underventilated rookeries, and it is here that the rise and growth of the system must be studied.

This class of houses was not forced upon the people, and those who occupy them are not the loudest class of grumblers. They do not complain, since they know no other existence, and hence have no personal experience by which to measure their comparatively miserable living. I say comparatively, for it may be the fact, that for many of these tenement occupants, to force them into other habitations would only make them active malcontents instead of the present patient sufferers. The longer the problem is studied the more complex it appears, and it would seem finally to narrow itself down to the question of how much the property owners must individually sacrifice for the general good. The tenement-house population, startlingly large as it is in the aggregate, has but little choice, as it has but little money, and so can be considered only as an inert factor in the problem.

The growth of the tenement-house had its origin within a generation. Gotham Court, in Cherry Street, the first of the breed, is yet standing. There was then rushing into the city a great flood of foreign immigrants; of course they had not come from tenement-houses, but they came with habits of life which found adaptable surroundings in the poorly-designed houses then built. The income from this class of property was satisfactory, and investments flowed that way; land which would pay in no other way brought good figures when covered with tenements, and the system grew until now over $200,000,000 are invested in this way. The time has now come when the people of the city, those who live and have homes, and do not merely exist and find shelter in a corner of a tenement, must take hold of the matter. The city is cultivating an element of weakness; it is harboring places of vice, festering spots of fever, and nurturing a dangerous class of the population which already holds the balance of power at the ballot-box.

It is not fair to say, however, that under the exact conditions of powers and people as we now find them, anything better than the tenements of to-day could have been expected; given, the average city lot 25 by 100 feet, given the necessity for a net revenue, under a heavy tax assessment of from six per cent upwards, and given a population who will not turn even so much as a little finger to make themselves one whit more decent, and you reach the inevitable result of a New York tenement-house. There are tenements in this city where order, thrift, cleanness, are to be found. They are neat and cheerful homes, and in each suite of apartments may be found as much real domestic bliss and decency as in the most expensive of the Albany or Newport flats in the more aristocratic quarters of the city. The rent is low, but the people have sufficient moral force, enough of cleanly habit, to enable them to make the best of their surroundings, and these surroundings are exactly adapted to a snug, moderate style of living. The tenement-house may, beyond doubt, give opportunity for all the squalor and indecent contact which the philanthropists so much deplore; but it also gives chance for the cultivation of kindly social companionship, and of helpful acquaintance on an humble scale; of the 21,000 tenement-houses in the city, a vast majority are of this latter class, or we should be living in a very Bedlam indeed. It is idle to talk to a tenant-house owner of sacrificing one tittle of his income for tenants who come to him with all sorts of promises, who hire a set of apartments "for a small family," and then take in a half dozen or more boarders, men and women, to "aise the rint," and make night and day one long orgie over potations drawn from the gin-mill on the first floor, which, perhaps, was hired nominally as a grocery store. Is it any wonder then that such an owner turns the control of his property over to an agent who goes, at intervals, well armed and well camphored to collect the stipend of rent? The same classes live in exactly the same state in the cabins scattered in the squatter settlements in the upper parts of the city. I venture the assertion that were but a tenth part of the energy spent in personal work at the tenements that is now exhausted in writing pamphlets, the evil could be mitigated into insignificant proportions. The experience of Mrs. Dr. Mills with the tenement 41 Park Street can be duplicated and reduplicated a thousand fold. Taking a single house of the worst class, this lady has by a few rules made of it a habitable place; she has taught her tenants how to live, and supplied the brains which they lack.

The committee now having the matter in charge might do some good by forming a company for the erection of tenements on a large scale, ignoring entirely the 25 by 100 feet size and securing that pure air, pure light, and that sufficiency of room for domestic privacy and purity which are the outward remedies for much of the evil, for all the trouble, indeed, except the vile man who inhabits these houses. Architects have done their best with the problem in all its limitations, and that best is the tenement-house of to-day. Unless the lot limit is abolished, unless rents are raised, or lower profits are acceptable, nothing better than the house of to-day can be devised; but here again it is worth while to see whether our present remedies are properly employed, for it is beyond doubt that some of the most offensive features of the present tenement need but the application of the present laws for their removal. The Board of Health have it within their province to remedy bad drainage and ventilation, and to purify foul sinks and closets. If the members of that board do not care to take the risk of rousing their political enemies by a vigorous enforcement of that power, the public must suffer. The Department of Buildings might make many a dark hall-way light and place many a window where none now exist, were its superintendent not too ready to keep on terms with the speculative builders of these houses; and if there is crime hidden in these great caravansaries, if the visitors can so readily find illegal tippling and gaming-places, acting as the moral plague-breeders in tenements, the police may find them as well, and put a short stop to them. But while the Police Department waits to have vice thrust into its face before applying the strong arm of the law to it, little aid can be looked for from that quarter. The trouble is not in the lack of laws, but in the lack of energy in executing the laws we have. W.

THE STATE CAPITOL.

Hartford, Conn.

The wrangle over the foundation piers of the drum and dome of the new Capitol building is creating no small excitement in Hartford, and all sorts of wild stories are afloat about the trouble. Narrowed down, it simply serves as another illustration of the folly of having an architect fill merely the post of a designer, without having the power of enforcing the proper carrying out of his plans and specifications. Mr. R. M. Upjohn, of New York, who has won such credit for the excellent taste and architectural skill shown in the building, went no further than the preparation of the drawings. The specifications provided that no changes should be made by the contractor without the written consent of the commissioners appointed by the State, and they were represented on the works by a resident superintendent. Mr. Upjohn made frequent visits to the site, but it was in the character of an adviser to the commissioners, and his directions carried hardly more weight than those of any other visitor.

There have been rumors of danger below ground. One had it that the tower and dome were settling and in danger of a fall, and that extensive alterations would be necessary. Another report made the danger still more imminent. Certain it is that the basements have been very carefully guarded against the intrusion of the curious, and when a short time since a sharp explosion was heard the excitement ran high. Both branches of the legislature have appointed committees of investigation, and much testimony has already been taken.

The trouble is with the piers supporting the tower upon which the stone dome rests. There are ten of these piers, six of them nine by seven feet in area, and the others of smaller dimensions. The specification required them to be built entirely of granite blocks in two-foot courses, and the drawings show the line of the joints in such way as to show three sides at least of every stone. With this there could not well be chance for improper bedding. To save a few thousand dollars the piers were changed to brick cores, faced with granite ashlar, and the joints being at shorter intervals gave opportunity for cob-castle building which was eagerly taken advantage of. The contractor now fails to show any written orders for the change. Mr. Upjohn did not see it until it had been made, and, knowing that abundant strength would be had if this mode of construction were properly carried out, made no remonstrance; nor was it his province to do so. In November last the dome was completed, but in October the edges of the granite ashlar work began to crack and the stones were badly spalled. A glance told that the stone had not been properly bedded, but instead had merely a face tooled on, and then by pinning up the work was made to look fair. It was, in short, as bad a piece of scamped work as ever was turned out. The contractor now declares that Mr. Brown, the superintendent for the commissioners, directed this style of work. But Mr. Brown is dead, and says nothing in rebuttal of this extraordinary assertion. The whole trouble lay in this single story of ten feet of granite facing. Above it was $800,000 worth of work. It would be well-nigh an impossibility to raise such a structure and rebuild the piers. Mr. Upjohn then suggested the tamping of the open beds with metal. Holes were cut along the joints and the interior spaces dried out by currents of hot air, after which molten type metal was run in. Some notion of the extent of the bad work may be had when it is stated that nine tons of metal have been used, and the cost of the repairs will reach $20,000. The present contractor, if he can shift the responsibility of the bad work upon the dead Mr. Brown, may escape the penalty of paying for the repairs, and thus force a payment out of some contingent appropriation.

A calculation shows that the greatest weight upon the smallest bearing surface is 232 pounds per square inch, and the greatest pressure upon the largest sectional area is 173 pounds per square inch. The depth of the granite ashlar is one foot nine inches, or, taking eighteen inches for a basis of calculation, and supposing the whole weight to come on the granite, a crushing strain of 364 pounds per square inch would bear on a surface of 52,704 square inches. Had the work been properly executed, and assuming 15,300 pounds per square inch as the crushing weight for granite, the actual strain would have been less than one fortieth of the real strength. The whole sectional area of the piers was 82,654 square-inches, and so according to the original plans the weight of 9,597 tons above the piers was amply provided for by Mr. Upjohn. That the commissioners thought proper to set aside the directions of that gentleman is the mistake for which somebody, probably everybody, in Connecticut will now have to pay. The brickwork above is without crack or crevice, and but for this bit of rascally work the building deserves all the praises for honest work which have been lavished upon it.

J.

RESOLUTIONS IN MEMORY OF THE LATE R. G. HATFIELD, ESQ.

AT a meeting of the Trustees of the American Institute of Architects, held at the rooms of the Institute on Wednesday morning, March 5, the following minute was unanimously adopted, and ordered to be entered upon the records of the Institute: —

"The Board of Trustees, assembled for the first time since his death, desires to express in a public manner its sense of regret at the loss which, through the death of its chairman, R. G. Hatfield, Esq., the Institute, the architectural profession of this city, and the public have sustained.

"To Mr. Hatfield's untiring interest in the conduct of the affairs of the Institute, a large measure of its success and influence was due, and his able and honorable practice of architecture has had no small weight in establishing the position which the profession now enjoys.

"The Board of Trustees gratefully calls to mind the fact that all Mr. Hatfield's intercourse with its members have been marked by uniform courtesy, and that his temperate counsel and consideration had won from them an unqualified regard and respect."

The Secretary is, hereby, instructed to enter the above minute upon the records.

A true copy from the minutes of the Board of Trustees of the American Institute of Architects.

HENRY M. CONGDON, Secretary.

AMERICAN INSTITUTE OF ARCHITECTS.

BOSTON CHAPTER.

AT the regular meeting for March, President Cabot in the chair, there was a discussion upon certain resolutions submitted by the executive committee regarding the extra assessment levied by vote of the last annual convention. An order was passed to pay this assessment out of the funds of the chapter, and the following resolutions were ordered to be sent to the Secretary of the Institute.

Resolved, That the Boston Chapter, on paying into the treasury of the Institute, on account of the assessment levied by vote of the last convention, the sum of four dollars for each member of the chapter, desires to express its conviction that such assessments are at present inexpedient, and cannot fail to be a great injury to the Institute.

Resolved, That the separate publication of the proceedings of the Institute seems, for the present at least, to be inexpedient in view of the expense of such publication, and of the fact that they would be acceptably presented and extensively published in the columns of the *American Architect and Building News*, without expense to the Institute.

A committee was appointed on motion of Mr. Preston to consider the expediency of encouraging in some way the recording by careful drawings of the archæological remains in Massachusetts, having in view especially old houses and other buildings of an architectural character. The committee has orders to report at the next meeting.

After the transaction of other business, a paper entitled Notes on Contracts was read by Mr. Theodore M. Clark.

A GOVERNMENT TESTING MACHINE.

THE New York *Times* says that Mr. A. L. Holley, at the recent session of the Institute of Mining Engineers, in Baltimore, described substantially as follows a testing machine of extraordinary power and range: —

The 400-ton testing machine, ordered in 1875 by the United States Board to test Iron, Steel, and Other Metals, has lately been completed at the Watertown Arsenal, thoroughly proved, and accepted by the board. The proof experiments were numerous, and the results fairly astonishing. A forged link of hard wrought-iron, five inches in diameter, was slowly strained, and broke short off with a loud report at a tension of 722,800 pounds. That the weighing parts of the machine were not disturbed by the recoil was proved by testing a horse-hair. It stretched thirty per cent, and broke at one pound. Specimens were also subjected to 1,000,000 pounds compression, and in every instance the machine gave admirable satisfaction. The inventor of this wonderfully accurate piece of mechanism is A. H. Emery. It cost the government $25,000, but it cost the contractor over $100,000.

Briefly described, the machine consists of a double-acting straining cylinder and ram on a carriage at one end, and a movable weighing apparatus at the other. The two are connected by a pair of eight-inch screws forty-eight feet long. Nuts, driven by shafting, move the straining cylinder to different places on the screws, so as to test long or short specimens of metals. The weighing apparatus is simply a reversed hydrostatic press, having diaphragms instead of pistons. The load is transferred by means of a fluid, — alcohol and glycerine, — by a series of large diaphragms to a series of small ones, and finally to a system of scale beams. Thus, a weight of 800,000 pounds, acting through a very small space, moves a finely graduated indicator at the rate of one hundredth of an inch to the pound. The steam-pump and the accumulator have cylinders and weights respectively for high and low pressures, and the machine receives pressure without pulsation from the accumulator only, when testing. The metal in the machine weighs 175,000 pounds, and includes pieces of 14,000 pounds, down to those of which 250,000 would weigh only one pound.

The importance of a testing machine of great power cannot be overestimated. Constructors are beginning to find out that it is not safe to predicate the physical qualities of large bars on those of small ones. One might as well exhibit a brick as the measure of the strength of a wall. A testing machine that will take in a whole bridge-post, and subject it to a regularly-increasing stress up to the point of destruction, is capable of developing structural defects, as well as the physical qualities of materials. The United States testing machine can apply 1,000,000 pounds compressive stress to metallic specimens of any length up to thirty feet. It is an engine of power and precision, in which lie the possibilities of a revolution in the manufacture of iron and steel and bronze, and in the proportioning and adaptation of structures. Congress, however, from some unknown cause, fails to realize the importance of the work of the board under the auspices of which this machine has been constructed, and now refuses to appropriate the money to make it available. It has refused to continue the board itself after the 30th of next June, and it has removed the custody of the machine from the board to the Secretary of War. If the Government would act with liberality in this matter, and furnish the requisite money for the use of the board to test the materials for bridge and ship building, it would find in the end that it had taken a step toward real, substantial economy. The enormous excess of material which loads down bridges with their own weight would be done away with, money would be saved, and the bridges would be safer. A tenth part of the money paid yearly in damages for railroad accidents, if appropriated by Congress to preventing them by a proper system of tests, would be saved to the people, to say nothing of the lives which would be saved. But Congress does not feel authorized to expend money in this helpful direction.

The labors of the board, which will conclude next June, have been faithfully performed. It was authorized to spend $15,000 for its own expenses; it did spend $2,248.79. The remainder of the appropriation was devoted to testing experiments. A large range of investigation has been covered, and the results tabulated. A complete chemical laboratory has been set up at the Watertown Arsenal, and Andrew A. Blair, late chemist to the board, has made two hundred and thirteen analyses of iron and steel, and two hundred and forty-nine of alloys. Commander L. A. Beardslee, United States Navy, has made the most exhaustive series of experiments ever recorded on chain cables and wrought-iron generally. Professor Thurston has made a complete series of experiments on bronzes. Chief Engineer David Smith, United States Navy, has made an elaborate series of experiments on tool steels, and Gen. William Savy Smith has devoted his attention to making some important tests of beams.

THE VIRTUE OF WATER-SEAL TRAPS.

IN a note with the above heading (*American Architect*, vol. v., p. 72), we are informed that Mr. Buchan's experiments "seem to show that, after all, there may possibly be more protection in a water-seal trap than is usually believed nowadays."

Mr. Buchan found that gases pass through water without difficulty, but his attempts to cause ferment germs to pass through water have failed. This does not affect the question in the least. The ferment germs, which are supposed to reach us through the agency of our sewers and drains, are germs whose increase is fostered by the presence of putrescible organic matter. It is accepted as a fact that in the case of perfectly clean sewers and perfectly clean house-drains, we have nothing to fear from this source. It is believed that our danger comes from the multiplication of the germs of disease in connection with the decomposition of organic wastes; that, the parent germ being introduced, it increases in the foul medium with which it comes in contact, — a suitable medium leading to a rapid increase with the usual escape into the surrounding air. It may very well be that the *transmission* of germs is prevented by a water-seal; but if, as is almost invariably the case in practice, the water-seal contains decomposible organic matter, its exposed surface being in contact with the air of the drain, the germs contained by that air will plant themselves in the inviting soil, will grow and multiply throughout its mass, and escaping with the exhalations at the house end of the trap, will continue their growth along the slime-coated pipe and become as abundant and active as though no trap had intervened.

GEORGE E. WARING, JR.

COLEMAN COUNTY (TEXAS) COURT HOUSE.

Topeka, Kansas, February 27, 1879.

To the Editor of the American Architect:

Sir, — Referring to the criticisms invited upon the Coleman Co. (Texas) Court House, I find the weight of materials alone to be 16 pounds per square foot, making a weight of 10,062 pounds equally distributed over each beam. Supposing the beam to be full 7 by 14 inches and not weakened by the cutting on the sides, its breaking weight is 32,812 pounds.

With a load of 175 pounds added to the weight of construction, provision must be made for sustaining a load of 335 pounds to the superficial foot. Leaving the conditions the same, and assuming the breadth to be seven inches, I find the depth required to be 16.69 inches, which proves the work to be unsafe. In the absence of a scale, I judge the available thickness of the timber to be only four or five inches, on account of the cutting, which makes it weaker by about one third.

L. M. Wood.

MODERN CHURCH BUILDING.

Baltimore.

The writer of the article on "Modern Church Building" has certainly misapplied the title if he considers it an exhaustive treatment of the subject; for commencing by the broad classification of the religious world into "Catholics and Ritualists" on the one hand, and "the remaining Protestant sects" on the other, he proceeds to speak immediately and exclusively of the building which, he states, is suited to the latter class. Recognizing the many faults of acoustics, etc., too often found in all our churches, it is to be observed that he comprises in "the other Protestant sects" a vast body of Christians all over the world (including the larger portion of the Protestant Episcopal Church of England and of America), with whom the correction of this fault is not the only desideratum in their churches, and whose services are not dependent only on the capacity of, and the advantages afforded to, an eloquent speaker, but who require temples for worship and praise and for the performance of various ceremonies and rites, and as much so to-day as at any age of the Christian era. Hence, although the writer gives very excellent suggestions for an auditorium, a lecture or concert hall, suited even to "social reunions and private theatricals," — no doubt the most convenient forms for a large class of Protestant worshippers, — he has hardly covered the whole ground of "Modern Church Buildings."

J. B.

ADVERTISING ARCHITECTS.

To the Editor of the American Architect: —

Sir, — It is undoubtedly true, that the commercial and enterprising spirit of this country tends to promote advertising in a greater degree than in any other land; and that perhaps there is good precedent and no real objection to an architect publishing his business location in a line or two of newspaper type, — simply as "John Jones, Architect, 44 Robinson's Building." But what is to be said of such advertising as we have seen in a daily paper, where we are told that somebody's successor is now prepared to execute as fine work as ever, in architecture, and reminded that the designs made by the firm in the past, having been noticed frequently and favorably by all who have been associated with them, is a sufficient guaranty of somebody's abilities as a first-class designer? In like manner we are notified that particular attention will be paid to furniture and interior decorations, which are now got up in the most elegant and tasty style, that prices are, as they always have been, very reasonable, and all who intrust their work will be fully repaid by so doing. Surely it is only one step further to "a prize with every roll of plans." We note the reasonableness of the charges and the "tasty" style of the work. These, combined with the first-class nature of the gentleman's abilities, go to make up a picture which must, one would think, take well with those thrifty parties who go in for economy at any price.

Yours, etc. D. I. Viders.

NOTES OF EXPERIENCE AND INEXPERIENCE.

Basin Overflows. — We see on looking back to Mr. Bugbee's communication that we were wrong. We took him to propose to run both waste-pipe and overflow out of doors, whereas he proposes to do this with the overflow alone. This, as he rightly argues, could do no harm, unless the pipe were so placed as to disfigure the house, for though the overflow is a necessary precaution, the discharge through it practically amounts to nothing. If preferred, all the overflows could be led together to any point where an occasional chance discharge would do no harm, and disconnected from the drainage. Mr. Bugbee says: "The meaning of my communication concerning the discharge of overflows from bath-tubs and wash-bowls was misconceived in your comments, in which you speak of the influence of climate. I propose simply an open pipe, no trap. It can't freeze up. It might let in cold air; but very little through an inch and a half pipe, and if the plug is put into the waste we need not trouble ourselves for a wonderful trap; any water seal would do." Eds

9. Old Materials. — There is no doubt that the materials always belong to the owner of the building from which they come; but it is customary to stipulate expressly that allowance shall be made by a contractor for any that are used in new work. But if a specification required him to work up old materials without requiring any allowance from him for it, he might very likely escape paying for it. The only safe way is to stipulate that the owner shall be credited with whatever is used in this way. Pl.

9. Old Materials. — The custom in Cincinnati is for the owner to tear down the old building clean, and neatly pile up the same, and the contractor to state in his proposition his allowance per M. for brick so furnished, and per perch for stone, and per thousand feet for lumber. Sometimes the contractor "lumps" the entire old materials, but the former custom is considered the best on account of its greater accuracy. A clause in the specifications would cover either way. C. C.

11. Wind Pressure. — On page 216 of the fourth volume of the *American Architect* Mr. John Dixon, C. E., says: "Twenty-eight pounds of pressure per square foot of surface would send a man flying through the air; it would sweep from the rails any (English) passenger train. Seventeen pounds pressure would level the Charing Cross Station." Probably Mr. Dixon is right, and as we do have, now and then, a train blown from the rails, or a large building blown inside out, I would like to know what pressures correspond to different velocities of wind. It is no uncommon thing to have the signal-service officers report the velocity of the wind at thirty or forty miles per hour. Indeed, the wind-gauge at Mt. Washington, N. H., registered only a month ago a velocity of one hundred and four miles per hour. What was the force exerted by it per square foot?

Wind-Gauge.

12. Trade Discounts. — Would it not be well if some trade-journal should publish discount sheets of the various kinds of building goods? The *Metal Worker* did so at one time, but for some reason has discontinued them. For architects, who are responsible for the correctness of the prices to which they certify, it is an immense annoyance to have nothing for certifying bills but the printed price-lists, — which without the discount sheets are of no more use than so much waste paper, — and to be obliged to form their opinions either *a priori* or from general recollection as to the correct prices. Take cast-iron goods for instance; how can an architect with a bill before him, and a printed price-list, be expected to know whether the discount on a particular article is 50 or 70 per cent? Sharp plumbers often send in bills for approval with all the materials charged at the list price, hoping that the architect will be too innocent to know that the discount on iron pipe is 70 per cent, and on brass work about 50, and they are too generally successful in this fraud. It is time, in the interests both of honest architects and of the public, that the whole system of concealed discounts and commissions was cleared up, and that those to whose care is confided the expenditure of large sums of other people's money should have better means of knowing the value of what they buy. Treasurer.

13. Waring's Check-Valve. — Can any impartial person say whether the Waring check-valve works well under sinks; say, as well as a ventilated S-trap in respect to clogging? The form seems likely to render it subject to catch lint and sediment in such positions. Anxious Architect.

NOTES AND CLIPPINGS.

Colored Glass Pictures. — The ancients had a most singular art of forming pictures with colored glass. It consisted in laying together fibres of glass of various colors, fitted to each other with the utmost exactness, so that the section across the fibres represented the objects to be painted, and then cementing them by fusion into a homogeneous mass. In the specimens of this art which were discovered about the middle of the last century, the painting has on both sides a granular appearance, and seems to have been formed in the manner of mosaic work; but the pieces are so accurately united that not even by means of a powerful magnifying glass can the junctures be discovered. One plate, described by Winklemann, exhibits a duck of various colors, the outlines of which are well decided and sharp, the colors pure and vivid; and a brilliant effect has been obtained by the artist's having employed in some parts an opaque, in others a transparent glass. The picture appears to be continued throughout the whole thickness of the specimen, as the reverse corresponds in the minutest points to the face; so that were the glass to be cut transversely, the same picture of the duck would be found exhibited on every section. It is conjectured that this curious process was the first attempt of the ancients to preserve the colors by fusing them into the internal parts of the glass, which was, however, but partially done, as the surfaces have not been preserved from the action of the atmosphere. [It should be added that these glass pictures are all small, usually being not larger than the ordinary Roman mosaics. — Eds.] — *Exchange.*

The Letting of Contracts in Ohio. — A bill is now before the Ohio Legislature which will, if passed, nullify the only good thing contractors now possess upon the statute books of that State. The good law referred to is one which necessitates the letting of all contracts in their separate departments. The amendment to this law makes it optional with County Commissioners, Boards of Education, and what not to receive proposals either for separate departments or for the entire work, as they may see fit, or it can be construed to mean that they (the Boards and what nots) shall receive both ways. The "rings," wire-pulling, and intrigues that would result upon this mode of the letting of public work would be a disgrace to any State having any desire for fair dealings.

A Trojan Dagger. — A dagger believed to be made of meteoric steel, exhumed by Dr. Schliemann in the royal palace of Troy, has been deposited by him in the British Museum. It is the first iron discovered by Dr. Schliemann in his explorations.

A Bruce and Wallace Monument. — Twenty-six years ago the sum of one thousand pounds was left in trust to accumulate, principal and interest, for twenty-five years, at the end of which time the whole amount was to be expended in creating a memorial at Edinburgh to William Wallace and Edward Bruce. It is not stated how large a sum is now at the disposal of the town council, but even at the low rate of interest which is customary in Scotland, there must be enough money to erect a memorial which will not shame the beautiful city, nor discredit with posterity the stalwart and upright characters of the men who are to be commemorated. It is suggested that the memorial shall take the form of two colossal bronze statues surmounting a fountain in the middle of an ornamental piece of water in the North Loch.